AUGUST, MDCCCLVII.

THE ZOOLOGIST:

A

POPULAR MONTHLY MAGAZINE

OF

NATURAL HISTORY

AND

JOURNAL FOR RECORDING FACTS & ANECDOTES

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Remarks on the Etymology of Names of Animals.

By the REV. PHILIP H. NEWNHAM, M.A.

> "POLONIUS. What do you read, my lord?
> HAMLET. Words, words, words!"
> *Hamlet*, Act. ii. Scene 2.

DURING the last few years Etymology has made great progress. We have outgrown the era of Johnson, Horne Tooke, Junius, and others of the same stamp, when a word was held to be sufficiently "derived" if it were referred to its counterpart in French or Latin, or if a strong resemblance could be traced between it and another word. So little, at this time, was the true theory of the science understood, that the most fanciful and arbitrary origins for words were elaborated. Etymology was thus brought into great disrepute: it was, for the most part, looked down upon by men of learning, as an amusement for dabblers and triflers, whose happiest conjectures merited little other praise than that which might be accorded to a successful pun.

This state of things, however, has given place to a sounder and more rational view of the science; and, in consequence, the not unmerited sneers which were then bestowed on etymologists are now heard less of. Nor has any one contributed more to the effecting this result than Mr. Trench, whose charming books have rendered the study of words so deservedly popular: no one has more successfully shown the fascinating interest that is excited by the disinterment of the "fossil history and poetry" that lurk beneath the apparently unattractive surface-soil of "mere words."

That the subject is one to which a strong interest naturally attaches few will venture to deny. When we speak of a dog, a horse, or a pig, surely we are not to be contented with simply knowing that these are the names of certain animals; should we not ask *why* they bear these names? Should we not ask whether there be any reason why a pig might not be called a whale, or the grampus change names with the eagle, without any principle being violated? And, if there be any such reason, should we not endeavour to investigate it? And, again, when we see how much of a nation's history—of its manners and customs, and antiquities—can be elucidated from a study of its language, we cannot help feeling how interesting, as well as how important, that study is. And there is abundant proof that this feeling is growing in the public mind: in all popular books on Zoology which

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have lately been published,—and especially in Mr. Bell's 'History of British Mammalia,'—the derivations of many of our vernacular names are given or attempted. These are signs which show that a want is being felt, which there is at present nothing capable of supplying.

Great progress, as I have said, has been made in unravelling the true family history of words. We are no longer confined to Johnson, but have other dictionaries to fall back upon, and, in particular, that of Webster, which is immeasurably the best, both in the amount of information supplied, and in general soundness of principle. Still, these are cumbrous volumes; their price makes them generally inaccessible; their information needs to be put in a less scattered, as well as in a more inviting form. A sounder and more comprehensive system, too, is very desirable: and, if this last remark be true of the whole subject, still more is it applicable to the names of objects belonging to natural science. Whatever dictionary we may consult, we cannot help feeling that the thing needed is a mind which combines some knowledge of Natural History with skill as a scholar and a linguist. We constantly find an origin ascribed to some name, from some supposed habit or characteristic which has its only existence in the fertile imagination of the ingenious lexicographer.

This subject has for some years been one of great interest to myself. I have felt the difficulties and deficiencies to which I have alluded, and I have therefore thought it would not be unacceptable to naturalists if some information of this kind could be presented to them in a condensed and readable form. And here I must, at the outset, express my utter abjuration of that system of philological falsehood in which people are now being educated, when they are taught that a certain word in one language is "derived from" a similar word in another language. The languages of Europe, as is well known, have a common origin: what that original stock was we cannot say,—probably the Sanscrit is the nearest approach to it. As the various tribes of men migrated westward, climate and other local influences modified their speech into dialects of the old root language. Thus, as we should expect, we usually find the same word, though often strangely modified, expressing the same idea in the kindred dialects of Europe, and often traceable back to its Eastern birth-place also. But we must remember that these forms have an *independent* existence; nor must we say that one is "derived from" another, unless a clear case of *importation* can be established.

My wish will be, wherever it is possible, to trace out this family connexion; not simply to rest satisfied with giving the root or origin of any name, but to find out the *Etymology*, or *true meaning of the word*, as well. In the present paper I shall confine my observations to the names of our own indigenous Mammalia.

I have now only to crave the indulgence of my readers: I must ask them to act upon the golden rule of etymologists, "Never reject an Etymology because it seems strange, or accept one because there is a strong verbal similitude." Of course I do not expect all persons to agree with me, nor do I wish it: I have no doubt I have made many mistakes, and I wish nothing that I have said to be looked upon as a dogmatic statement: I wish my attempt to go for what it is worth. I put it forward in all diffidence, with the hope that it may, at all events, serve as a stepping-stone by which some other mind shall be able to grasp higher things than my own ability, leisure, and power of procuring books can enable me to hope after reaching for myself.

The etymology of the word *bat* is involved in most disheartening obscurity: Skinner derives it from the Anglo-Saxon *bat*, a boat; because, with its wings expanded, it resembles a boat impelled by oars. This hardly needs to be characterized as a fanciful conjecture: he, however, compares it with its Arabic name, *baphus*. It is to be noticed that G. Douglas calls it *bak*, and its Scotch name to this day is *backie-bird*.

Assuming the word to be aboriginal in its present shape, I shall venture to put forward a suggestion, first entering a caveat that I look upon it as a mere conjecture. How is it that the word *beetle* signifies both the insects known by that name and also a large hammer or mallet? In the latter sense it manifestly originates from the verb to *beat;* and the name of the insects may come from the same source, from the habits of one of the best known of them,—the common cockchaffer: every one knows what a pest this creature may become, when one is out on a summer evening: they *beat* around your head and mob you, just as swallows do to a cat. Now the little pipistrelle has a precisely similar habit; and hence the fancy has crossed my mind that the name of *bat* may be drawn from hence.

Fluttermouse, *flittermouse* and its corruption *flintymouse* are common provincial names for the bat: these need no explanation; but they are interesting, inasmuch as, together with many other vernacular terms, they show the just appreciation of natural affinities which our rustic forefathers possessed. *Reremouse* is a somewhat similar term, by which the bat is known in heraldry; and in 'Midsummer Night's Dream" (Act ii. Scene 2), Titania bids her attendant sprites,

> "Some war with reremice for their leathern wings,
> To make my small elves coats."

The first syllable of the name is our common word to *rear;* thus signifying the *mouse* that has the power of *rearing*, or raising itself from the ground.

Noctule, *pipistrelle* and *serotine* have much the same meaning. *Noctule* is the Latin *noctula*, from *nox*, night. *Pipistrelle* rejoices in the Italian modifications of *pipistrello*, *vipistrello* and *vespertillo;* thus enabling us to identify it as only a corruption of *vespertilio*, derived from *vesper*,—a name primarily applied to the evening star. *Serotine* is the Latin *serotinus;* from *serus*, late.

The *barbastelle* is named from its hairy lips: the Latin *barba* is *beard*, from a root signifying *roughness*, which appears also in the word bristle, and a thousand other modifications. The name of the *horse-shoe bat* requires no comment.

Mr. Talbot, in his 'English Etymologies,' suggests that the name of *hedgehog* is, in its origin, *edgehog*, from the Anglo-Saxon *ecge*, Danish, Swedish and Icelandic *eg*, a point; referring, of course, to piggy's sharp spines. And this etymology is rendered the more probable when we compare the German *stachel-schwein* and the Danish *pinswin*, both words signifying "thorn-hog."

The original name of the *mole* is *mouldwarp* or *mouldiwarp*, from the Anglo-Saxon *weorpan*, *warp* or throw up; and *mold*, now spelled *mould*. It still retains its original name in some parts of the country, although the English love for monosyllabizing has long since adopted the shorter form for general use. Gascoigne, who wrote in the sixteenth century, used *mowle* and *mouldiwarp* indifferently. It is interesting to trace in words like this the development of the nation's character. Business and hard matters of fact bring along with them all manner of abbreviations and curtailments.

The word *shrew* has been referred to the Anglo-Saxon *schreadan* (the origin of our *shred*), or to *scheorfian*, to bite, or *schrif*, to censure,—words akin to our *sharp;*—and the idea conveyed by the name is supposed to be derived from the old tales of its running over and biting cattle. No doubt the word shrew has been applied to female scolds; and the old exclamation, "Beshrew thee," has taken its origin from some source of this kind. But we find words in other languages which are obviously identical with shrew; and these words are as obviously to be referred to a very distinct root. With the Anglo-Saxon *schreava* I should compare the French *souris*, Latin *sorex*, and Greek *ὕραξ*. The meaning of the name is shown us by our own word *shrill*, as also the Sanscrit *svri*, to whisper. Country people generally make two syllables of the word, pronouncing it "*sher-ew*." This confirms the idea that the name is imitative of the animal's voice.

Erdshrew is also found as a name for this creature. The first syllable is clearly the Anglo-Saxon *eorth*, earth.

Badger is derived by Skinner from the Teutonic *back*, a jaw, from the strength of that part in our animal. To my mind this is hardly satisfactory; but I have nothing better to offer. *Brock*, Anglo-Saxon *Broc*, is a name given from the sulky snarling of the creature when "badgered." In Welsh *broc* also means a *noise*. Like the name of our *rook*, and the Latin *raucus*, harsh, it is intended to imitate harsh or unpleasant cries.

Weasel is the Anglo-Saxon *wesle*, Dutch *wesel*, German *wisel*. Probably it is named, like the shrew, from its shrill *whistling* cry.

Ermine in Spanish is *Armenio*. Gwillin, in his 'Display of Heraldrie,' gives the origin of the name:—"This is a little beest, lesse than a squirrell, that hath his being in the woods of the land of Armenia, whereof hee taketh his name." *Stoat* is undoubtedly the same word as *stout*, as the name is still pronounced in some parts of the country. In the 'Gentleman's Magazine' for 1784, p. 732, we read:—"Perhaps the fumart is the animal we know here (Berkshire) by the name of the *stout*, though very improperly called so, being, I believe, the smallest beast we have, except the mouse. It partakes of the nature of the weasel." But this difficulty is removed when we remember that *stout* originally meant *bold;* and, improper as the word seems in its usual acceptation, we at once recognize its truthfulness in the sense of *stout-hearted*.

Foumart, *fumart*, *fulimart*, and other varieties of spelling, are all of them contractions of *foul marten*. The name is of course derived from the disgusting smell of the well-known secretion of the animal. The same prefix appears in the name of the *fulmar*. *Polecat* is a word which has given rise to many conjectures. Mr. Bell suggests that it is simply *Polish cat;* but historical evidence is wanting whereby to connect it with Poland. Mr. Talbot thinks that it may mean *furcat;* and he compares the Anglo-Saxon *pylca*, a fur garment; *poell*, a cloak;—which are identical with the Latin *pallium*, cloak; *pellis*, skin: German, *pelz*, fur; *fell*, skin: and our own word *peel*. But in the root from whence we take our word *foul* (and which runs back finally to the Sanscrit *puj*, to rot) *p* and *f* seem to be used interchangeably: hence I feel inclined to regard *pole* as merely a modification of *foul*.

Ferret is, German, *fret*, *frettel;* French, *furet;* Spanish, *huron*, *furam;*—all taken from the Latin *fur*, a thief. It seems doubtful whether the Latin *viverra* be really belonging to this root.

Otter presents us with an etymological nut by no means easy to crack. In German it is *otter*, in French *loutre*, in Latin *lutra*. By fathering this upon some such word in Greek as λούτρα, which would signify *bather*, we can at once get rid of the difficulty. But the insuperable objection remains that the Greeks had no such name for the otter. Now, just as *ounce* has passed through the French *l'once* into the Italian *lonza*, and as *lierre* (ivy) was originally *l'ierre* (from hedera), so *loutre* and *lutra* have originally come from *l'outre;* so that the *l* is no essential part of the word. Again, in German *otter* not only means our animal, but *adder* also; and the two words are, in fact, etymologically identical. *Adder* was originally written *nedre*, the *nether* or creeping animal. It was a generic term, just like serpent or reptile, both of which words mean *creeper*. This prefixed *n* appears again in the Latin *natrix*, snake, and our own *natter*jack; and the parallel is further kept up by the Spanish for otter being *nutria*. Thus I am inclined to believe that the resemblance of the long, lithe otter to a swimming reptile will furnish us with the true key to the origin of the name.

Marten is in Anglo-Saxon *mearthe*, French *marte*, German *marder*, Latin *martes*. It is named from its rapacious and *murderous* disposition; as Vossius and Gesner say, because it destroys poultry, &c., "vi martiâ." It need hardly be said that the name of the house-*martin*, however similar at first sight, has a wholly different origin.

Dog is the Teutonic *docke*, French *dogue*, Phrygian *daus*. On listening carefully, any tolerable ear will at once be struck with the fact that very few of our dogs enunciate the "bow-wow" of our nursery ideas. All, without exception, end off with a *g*, or strong guttural *gh*. "Bog," "wog" are the cries of many dogs; but a very large proportion prefix a *d* to the sound, and utter their own name very distinctly; and from this fact I believe the name to be derived, as so many other names are. I may mention that I had observed this peculiarity years before I had turned my attention to etymology. On the origin of the feminine term *bitch* I can only hazard a conjecture. In German it is *betze* or *petze*. Now, in French *biche* is a doe, and in German *bache* is a wild sow; and these words bear a strong family likeness to each other. I am inclined to believe that they are artificial feminine modifications of the word *buck*, possibly first applied to the female deer, and afterwards transferred to other animals, exactly as is the case with our own *buck* and *doe*.

Hound, the Gothic *hund*, is the Greek *κύων*, which, like many other words beginning with the same letter, was pronounced, not with a *k*, but with a strong guttural *h*. In French *chien*, and in Latin *canis* are identical forms, and in Sanscrit we also find *çvan* and *çun*, besides a host of other and apparently most dissimilar modifications of the same root in kindred dialects. *Hound* means the *hunter*. It is identical in origin with the words *hunt* and *hand*, and may be traced to the Gothic *hinthan*, Latin pre-*hendere*, to seize.

Puppy is the Latin *pupus*, *pupa*, our own "*poppet*,"—terms of endearment, in the first place applied to young children, and afterwards transferred to the young of animals, and, as was natural, retained in particular by the most domestic among them. Our word *baby* is of the same family; and all these names, as well as *papa* and other similar ones, are imitations of the earliest cries of children. Puppy, as applied to a fop, is no doubt a corruption of puppet, in the sense of a dressed-up doll, just in the same way as we find *muneco, manikin*, used in Spanish.

Whelp is the Danish *hvelp*, Swedish *valp*, and in all probability the Latin *vulpes*. Primarily applied to fox-cubs, and then made of more general application, it affords us a curious instance of a process exactly the reverse of what we have seen to be the case in *puppy*. *Vulpes* is the same word as our *wolf*, and may be traced back to a Sanscrit origin, signifying the *tearer* or *gripper*.

Of the numerous varieties of dog, I have been able to trace the origin of the following. *Bandog* seems to be compounded of band and dog, and to have been originally a sort of general term, applied to those dogs whose fierceness obliged them to be always kept *bound* or chained up. *Beagle* is the French *bigle*. Skinner derives it from *bugler*, to *bellow* (or to *bell*, as we say of deer), from their deep, sonorous bark. Following the same idea, Richardson thinks that it may be formed from some diminutive of the verb *to bay*. Skinner also suggests as an origin the Italian *piccolo*, small; but this seems more like a *guess* than the others. In French *bigler* is to *squint;* whence it is probable that *bigle*, as the dog's name, is only a French way of spelling our own word. *Brach* is a word we meet with in Shakspeare and elsewhere. It is French *braque*, Dutch *brak*, Italian *bracco*, Spanish *braco.* The Spanish *braco, brazzo,* Italian *braccio*, are the Latin *brachium*, arm; and hence it is probable that our name has its origin from the idea of *pointing.*

Cur has a curious derivation. It is corrupted from *curtailed*, the Latin *curtus,* short. By the old forest laws all dogs found straying were to be deprived of their tails, as a mark of disgrace; and such dogs were thereby disqualified for hunting or coursing. Hence the word became gradually more extended, and, as forest laws became obsolete, the name acquired a general application to "curs of low degree."

It is not easy to choose between the various derivations proposed for *greyhound.* Its Latin name is *canis graius;* and some have supposed this to mean *Grecian* dog, as though this variety were first used by the Greeks; but this lacks historical confirmation. Another suggestion is the Dutch *grüphund*, from *grypen*, to gripe. This is not a bad idea; but I am inclined to agree with Mr. Bell when he says:— "Perhaps, after all, the most simple and obvious derivation,—from the prevailing colour of the original breed of these dogs,—is the true one."

The *harrier*, Anglo-Saxon *harier*, is no doubt simply the dog used for hunting the hare. In this sense it must not be confounded with harrier, the name of the hawk, which is named from its *harrying* propensities, just as our word *havoc* refers to the devastations committed by the *hafoc* or hawk. Still, it may be too much to say that the verb *to harry* has had *no* share in causing the name of our dog to be spelled with a double *r*, instead of the single one which appears in the Anglo-Saxon.

Lurcher is a dog that *lurks* or watches slyly for his game. To *lurch* is an old word, meaning to defeat or disappoint, also to cheat or defraud. It is probably derived, as Johnson suggests, from *l'ourche*, an old game, something like our draughts. We can easily suppose that the game gave employment to numbers of blacklegs, "et hoc genus omne," which accounts for the idea of cheating or secret dealing which runs in our words lurk and lurch.

Mastiff is the French *mâtin* (for mastin), Italian *mastino.* Skinner derives it from the French *maison tenant,* "house-keeper." I have no feeling of confidence in this etymology, but can find none other.

Poodle is the German *pudel*, "a rough or curled dog." The same word also means "a cropped or curled head of hair." The connexion between the two meanings is obvious. No doubt the word is derived from *puder*, powder; and thus the name of our dog will serve to keep in mind, for the benefit of future generations, the memory of the "good old time" when wigs and hair-powder were indispensable.

Pug.—This word seems to be the Anglo-Saxon and Swedish *piga*, Danish *pige* (a *girl*, whence our name Peggy), Spanish *poco*, Latin *paucus* (few), and perhaps the Greek πυγμαῖος, pigmy. The name was first applied to the monkey, as resembling a pigmy man, and was thus transferred to a variety of dog whose flat nose somewhat reminded one of a monkey. Now, there are many words which exhibit what may be called a pregnant etymology. They may be referred, in the first place, to one root; but they are also influenced by other roots, of similar sound but of totally dissimilar meaning. It is probable that our present word is a case of this nature. *Pug*, as applied to a monkey, may have a secondary reference to the name of *Puck*, the mischievous elf of fairy tales, whose name is akin to *bogle*, *bug*, *bugbear*, and other words which are taken from a root denoting terror.

Spaniel is corrupted from the French *espagneul*, Latin *hispaniolus*, the breed being originally Spanish. *Terrier* is from the Latin *terrarius*, "earth-dog," "from its subterranean employ," says Pennant.

Lastly, a *mongrel* is a dog of *mixed* breed, from the Anglo-Saxon *mengan*, to mix; German, *mengen;* our own *mingle*.

(To be continued.)

P. H. Newnham.

Guildford.

On the Aquarium; being the Substance of a Discourse delivered by Robert Warington, Esq., at the Royal Institution of Great Britain, on Friday, March 27, 1857.

The speaker opened the evening's demonstration by stating that he had immediately responded to the invitation of the Managers of the Royal Institution to deliver this discourse, on what they had been pleased to call his "own subject," from the feeling that, as the originator of the aquarium, he was in duty bound to afford to all those who had taken up this "new pleasure" every assistance, from the results of his own experience, that lay in his power, in order to render the undertaking more easy and pleasurable; and for this purpose he proposed to lay before his audience, as far as was practicable, a demonstration of the principles on which it was founded, particularly as very erroneous ideas had been promulgated on the subject, and instructions given in several most engaging publications which might tend materially to mislead and disappoint those inclined to recreate themselves with this interesting subject.

HISTORY.

After a short sketch of the several discoveries in the various branches of Science embraced in this subject (as the experiments of Lower, Thurston, Hooke and Mayo, on respiration and animal heat; the presence of air in water, and its necessity for supporting the life of fish, by the Hon. Robert Boyle; the discovery of fixed air, carbonic acid, by Dr. Black, and its production in respiration; the experiments of Priestley, Ingenhousz and Sennebier, on the action of submersed aquatic vegetation, exposed to light, in removing carbonic acid, and restoring oxygen to the air dissolved in water; all of which had been since substantiated by numerous experimenters), a cursory review was given of the common employment of the ordinary fish globe, the cisterns, tanks, pans and tubs, with their fish and water plants, to be seen every day in our conservatories and greenhouses, and the glass cylinders used by almost every microscopist for preserving Chara, Nitella, Vallisneria, and other like plants, in which the circulation of the sap was visible, as also for propagating Rotifers, Stentors, and other microscopic animalcules; the consideration of which points brought the subject up to modern times. Mr. Warington then proceeded to give an account of his own experiments, and the reasons which had led to their commencement, namely, the statements made for a series of years in our works on chemistry,* that growing vegetation would counterbalance the vital functions of fish. To test the truth of this and its permanence,† a large twelve-gallon receiver was filled to about two-thirds its capacity with river water, and some clean washed sand and gravel, with several large fragments of rock-work placed in it, the latter so arranged as to afford shelter to the fish from the sun's rays. A good healthy plant of Vallisneria spiralis was then transplanted, and as soon as it had recovered from this operation a pair of gold fish were introduced. The materials being thus arranged, all appeared to progress healthily for a short time, until circumstances occurred which indicated that another and very material agent was required to perfect the adjustment and render it at all permanent, and which at the commencement of the experiment had not been foreseen. The circumstances alluded to arose from the natural decay of the leaves of the Vallisneria, the increase of which rendered the water turbid, and caused a rapid growth of green confervoid mucus on the surface of the water, and upon the sides of the receiver; the fish also assumed a sickly appearance, and had this been allowed to progress they must have speedily perished. The removal of this decaying vegetation from the water as fast as it was formed became, therefore, a point of paramount importance; and to effect this recourse was had to a very useful little scavenger (whose highly important and beneficial functions throughout all nature have been too much overlooked, and its indispensable uses in the economy of animal life not well understood), the water snail, whose natural food consists of decaying and confervoid vegetation. Five or six of these little creatures, the Limnea stagnalis, were consequently introduced, and by their extraordinary voracity and continued and rapid locomotion soon removed the cause of interference, and restored the whole to a healthy state.

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* Brande's 'Elements of Chemistry,' 1821, and repeated up to the present time.

† 'Quarterly Journal of the Chemical Society,' 1850, Vol. iii. p. 52.

Thus, then, was established that wondrous and admirable balance between the animal and vegetable kingdoms, and by a link so mean and insignificant as almost to have escaped observation in its most important functions. The principles which are here called into action are, that the water, holding atmospheric air in solution, is a healthy medium for the respiration of the fish, which thus converts the oxygen constituent into carbonic acid. The plant, by its vital functions, absorbs the carbonic acid, and, appropriating and solidifying the carbon of the gaseous compound for the construction of its proper tissues, eliminates the oxygen ready again to sustain the health of the fish; while the slimy snail, finding its proper nutriment in the decomposing vegetation and confervoid mucus, by its voracity prevents their accumulation, and by its vital powers converts that which would otherwise act as a poisonous agent into a rich and fruitful pabulum for the vegetable growth. Reasoning from analogy, it was evident that the same balance should be capable of being permanently maintained in sea water, and thus a vast and unexplored field for investigation opened to the research of the naturalist; and this proved on trial to be the case.

PRINCIPLES OF THE AQUARIUM: THE AIR CONTAINED DISSOLVED IN WATER.

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1·56 volumes of nitrogen gas,
3·70 „ oxygen gas,
100·00 „ carbonic acid gas ;

and hence we find that the air absorbed by water, and existent in rivers to the extent of from 2 to 3 per cent., consists of about 29 of oxygen and 71 of nitrogen. In fresh-fallen rain and melted snow it ranges from 30 to 35 per cent of oxygen, and in some spring waters it has reached as high as 38 per cent. This oxygen, by the process of respiration, is converted into carbonic acid gas, or mephitic air, the choke-damp of the coal-pit, a gas highly poisonous to animal life; but here comes into play that beautiful and wonderful provision which, by the action of growing vegetation under the influence of the sun's light, converts this baneful agent into vital oxygen, the "breath of life."

WATER, FRESH AND MARINE.

The water used for the aquarium should be clean, and taken direct from a river, or from a soft spring, and should not have been purified by means of lime.

As regards sea water, it should, if possible, be taken at a distance from shore, and at the period of high water. If artificial sea water is employed, it should be made either from the saline matter obtained by the evaporation of sea water,* or by the following formula:—

Sulphate of magnesia	7½ oz.
„ lime	2¾ „
Chloride of sodium	43¼ „
„ magnesium	6 „
„ potassium	1¼ „
Bromide of magnesium	21 grains
Carbonate of lime	21 „

These quantities will make ten gallons. The specific gravity of sea water averages about 1·025; and when from evaporation it reaches above this, a little rain or distilled should be added, to restore it to the original density.

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* This is prepared by Messrs. Brew and Schweitzer, of 71, East Street, Brighton.

VEGETATION.

The plants best fitted for fresh water are the Vallisneria spiralis, the Myriophyllum, Ceratophyllum, and the Anacharis, all of them submersed plants, and fulfilling the purposes required most admirably. From the great supply of food in the aquarium, the growth of the Vallisneria is very rapid, and it requires, therefore, to be thinned by weeding; this should never be done until late in the spring, and on no account in the autumn, as it leaves the tank with a weakened vegetation at the very time that its healthy functions are most required.

The vegetation of the ocean is of a totally different character and composition, being very rich in nitrogenous constituents. There are three distinct coloured growths,—the brown or olive, the green and the red. For the purposes of the aquarium, where shallow-water subjects are to be kept, the best variety is the green, as the Ulvæ, the Enteromorpha, Vaucheriæ, Cladophora, &c. These should be in a healthy state, and attached to rock or shingle, when introduced. We shall have occasion to notice the Rhodosperms under the head of 'Light.'

SCAVENGERS.

A most important element in establishing and maintaining the permanent balance between the animal and vegetable life, without which no healthy functions can be secured, and the aquarium must become a continued source of trouble, annoyance and expense. The mollusk which was first employed, the Limnea stagnalis, was found to be so voracious as it increased in size that it had to be replaced by smaller varieties of Limneæ, by Planorbis, and other species of fresh-water snail. The number of these should be adjusted to the quantity of work they are required to perform. In the marine aquarium the common periwinkle fulfils the required duties most efficiently, and is generally pretty active in his movements. The varieties of Trochus are also most admirable scavengers; but it must be borne in mind that they are accustomed to mild temperatures, and will not live long in a tank liable to much exposure to cold. The Nassa reticulata not only feeds on the decaying matters exposed on the surface of the rock-work and shingle, but burrows below the sand and pebbles, with the long proboscis erected in a vertical position, like the trunk of the elephant when crossing a river. But in the ocean there are innumerable scavengers of a totally different class, as the Annelids, Chitons, starfish, nudibranch mollusks, &c.; thus affording a most beautiful provision for the removal of decaying animal matter, and converting it into food for both fish and man.

LIGHT.

It is most probable that the greater amount of failures with the aquarium have arisen from the want of a proper adjustment of this most important agent, the tendency being generally to afford as much sun's light as possible; but on consideration it will be found that this is an erroneous impression. When the rays of light strike the glassy surface of the water, the greater part of them are reflected, and those which permeate are refracted and twisted in various directions by the currents of the water; and where the depth is considerable it would be few rays which would penetrate to the bottom; but let the surface become ruffled by the passing wind, and it is little light that can be transmitted; and when this same disturbing cause lashes into waves and foam, not a ray can pass, and all below must be dark as night. Too much light should therefore be avoided, and the direct action of the sun prevented, by means of blinds, stipling, or the like. It is a great desideratum to preserve the growth of the lovely red Algæ in all their natural beauty, and prevent their becoming covered with a parasitic growth of green or brown-coloured plants; this can be effected by modifying the light which illuminates the aquarium, by the intervention of a blue medium, either of stained glass, of tinted varnish, coloured blinds, &c. The tint should be that of the deep sea, a blue free from pink, and having a tendency rather to a green hue. This modified light affects also the health of those creatures which are confined to shallow waters, so that a selection of the inhabitants must be made.

HEAT.

The proper control of this agent is also most material to the well-being of these tanks; for experience has proved that an increase or diminution of temperature beyond certain limits acts most fatally on many of the creatures usually kept. These limits appear to be from 45° to 75° Fahrenheit. The mean temperature of the ocean is estimated to be about 56°; and this does not vary more than 12° throughout the varying seasons of the year, showing the extreme limits to be from 44° to 68°. Great care should therefore be taken to afford as much protection as possible, by the arrangement of the rock-work, both from the sun's rays by day, and the effects of radiation at night, as, from the small volume of water contained in the aquarium, these effects are rapidly produced.

FOOD.

As many persons, to whom those interested in these matters have naturally looked for instruction, have decried the idea of feeding, it will be necessary to offer a few remarks on that point. How creatures so voracious as most of the denizens of the water are, both fresh and marine, are to thrive without food, is a question it would be difficult to solve: common sense would say they must gradually decrease in size, and ultimately die from starvation. The food employed should be in accordance with the habits of the fish, &c.; for the vegetable and mud feeders, vermicelli crushed small, with now and then a little animal food, as worms, small shreds of meat, rasped boiled liver, and the like; for the marine creatures, raw meat dried in the sun, and moistened when used, answers very well. Oyster, mussel, cockle, raw fish, shrimps, and the like matters may be employed; these should be cut or pulled into very small pieces, and never more given than they can at once appropriate; and if rejected by one it should be transferred to another, or removed from the tank. In the case of Actinia, they require, from their fixed position, that the food should be guided to their tentacles; and if the animal food, of whatever kind, is soaked in a little water, and the water thus impregnated with animal fluids be dropped in moderate quantity into the tank, it will afford food for the small Entomostraca, and smaller creatures with which the water abounds, and which constitute the food for many of them.

A few observations were also made on the construction of a microscope for the purpose of employment in connexion with the aquarium, and the method in which such an instrument could be used.

The Mollusca of the Firth of Clyde.

By the Rev. ALFRED MERLE NORMAN, B.A.

THE notes which have hitherto appeared in the pages of the 'Zoologist' on our Marine Invertebrata have been but few and far between. There have been admirable papers by Mr. Gordon on the Zoology of the Moray Firth, and a few others on a less extensive scale, though equally valuable as regards the particular branch of the Invertebrata to which they have relation. Although much remains to be done, and no one district has, as yet, been thoroughly investigated in all the branches of Marine Zoology; yet it is probable that our seas have been more thoroughly searched than those which wash the shores of any other portion of the world. This being the case, it is much to be regretted that those who have been most active in their investigations and who have devoted much time, trouble and money, to dredging and other means of capturing and studying the denizens of our salt waters, should keep all their knowledge to themselves, and that the results of their investigations should have been so very partially made known.

It is my intention to give somewhat similar lists to those of Mr. Gordon on the Marine Invertebrata of the Firth of Clyde. Will not other naturalists who have carefully examined any particular district of our coasts give the readers of the 'Zoologist' an insight into the result of their labours, by publishing some account of them in its pages? I know many of its readers who would warmly welcome such lists, if full and carefully prepared, but the greatest care should be taken that no mistakes be made in the discrimination of species; I mention this from having not unfrequently found the most egregious blunders in local lists relating to objects of Natural History: above all, if an error be made and afterwards discovered, it should be at once rectified; all are liable occasionally to fall into error, but it is unpardonable, when others have been misled by us, not to correct them if in our power.

The district which these notes are intended to include is that portion of the "Clyde Province" which constitutes the "Firth of Clyde" proper. It thus embraces that part of the Clyde Province which lies between the Isles of Bute and Arran and the Ayrshire coast, extending southwards as far as the town of Maybole and the southernmost point of the Isle of Arran. It excludes that part which lies to the west of Bute and Arran, namely Kilbrannan Sound and Loch Fyne, as well as those waters which extend from the southern extremity of Arran to the Irish Coast. In these parts I have never dredged: Loch Fyne is glorious ground; would that my dredge had formed its acquaintance! It will be seen that the arm of the sea to which this paper refers is a comparatively limited one, but it will be found to be extremely productive in all branches of Marine Zoology.

The investigations, on which these papers are based, were made by me during the year 1854, which I spent upon the Isle of Cumbrae, in the very centre of the district named, and during which I thoroughly examined the sea all round its shores. In the early spring of 1855 I was, for a week or two, on the Isle of Arran, for the purpose of dredging in Lamlash Bay and hunting up the shore.

This paper will, however, be much indebted to the labours of others. The Clyde has had accurate and active observers, who have examined almost all parts of it most carefully, and who, living on its shores, and having ample opportunities and appliances for its investigation, have devoted much of their time, and that too, most successfully, to the study of its inhabitants. In the eighth volume of the 'Memoirs of the Wernerian Society,' published in the year 1838, there appeared a paper, "On the last changes in the relative levels of Land and Sea in the British Islands, by James Smith, Esq., of Jordanhill, F.R.S.L. & E., F.G.S. & M.W.S.:" this paper contains a "Catalogue of Recent Shells in the Basin of the Clyde and the North Coast of Ireland," to which I shall make frequent reference. Mr. Smith added from the Clyde many most interesting shells to the British Fauna; among these may be mentioned Pectus danicus and striatus, Pilidium fulvum, Propilidium Alcyloide, Puncturella Noachina, Trichotropis borealis (?) and Mangelia Leufroyi. No year passes without his yacht skimming the surface of the Clyde, while his dredge brings him into communication with the ground beneath. Mr. Smith is, however, even better known as a geologist than as a conchologist, and his researches into the recent beds of the Clyde are of great interest. In the following catalogue I have affixed an asterisk to those shells which Mr. Smith has found fossil in the "Newer Pliocene Deposits" of the Clyde: under this name of "Newer Pliocene," Mr. Smith has included two deposits, — the first, a few feet only above the present sea level, does not contain any fossils, except of such shells as are still to be found recent in the Clyde; the second, at a somewhat higher level and underlying the last-mentioned, abounds in fossils embedded in a stiff clay, the majority of which are still to be found living in the neighbouring sea; but a few, though still extant in more northern places, are no longer to be met with as denizens of the waters of the Firth of Clyde. These deposits are frequently spoken of by Forbes and Hanley as the "Pleistocene," or "Glacial Beds" of the Clyde.

At Saltcoats there lately lived an eager, acute, and energetic naturalist, whose name will be familiar to all, the Rev. David Landsborough, D.D.: he was the author of 'The Excursions to Arran, Ailsa Crag and the two Cumbraes, with reference to the Natural History of these Islands.' This work, which was published by Johnstone and Hunter, of Edinburgh, gives us an insight into Dr. Landsborough's Natural-History trips over just that district which I have already described, and from his researches these papers will derive much of their value. I had looked forward to forming the acquaintance of a naturalist, who had taste so congenial to my own, and who was so conversant with almost all branches of Natural History, but this was not to be! Soon after I went to Scotland, the ravages of cholera carried off one who was even more regretted as a man than he was as a naturalist.

Major Martin, who resides at Ardrossan, has for many years devoted much time to the study of the Marine Zoology of that neighbourhood, but I believe that he has attended more to some other branches of Natural History than he has to the Mollusca. There are many other familiar names which will here and there occur in these notes as contributors to the zoology of the Clyde, but I have now mentioned the only naturalists who have done more than paid a passing visit to its waters.

The arrangement and nomenclature used is that of Forbes and Hanley's 'British Mollusca.' Where the first name is succeeded by others between brackets, such names are the synonyms by which the mollusk is designated in Mr. Smith's catalogue and Dr. Landsborough's work. If a name between brackets has an asterisk attached, it is one that occurs in Mr. Smith's 'Catalogue of the Shells from the Newer Pliocene Deposits of the British Islands,' and is not used in reference to a recent shell by either of the writers referred to. Any deviations from the nomenclature of Forbes and Hanley will be noticed when they occur.

Class I. ACEPHALA.

Div. I. Tunicata.

This branch of the Mollusca has hitherto been greatly neglected. It presents an obstacle which unfortunately stands in the way also of many other branches of Natural History, namely, the impossibility of preserving its members without their suffering a total loss of beauty; added to this, the want of a good book upon the subject is greatly felt by those who would be willing otherwise to embrace it in their studies. Most beautiful the Tunicata certainly are; for although the most common species of the Ascidiæ, A. mentula, is not very attractive in its appearance, many of the rarer Ascidiæ are lovely, and all the Botryllidæ are most exquisite objects when alive. I wish the following list to be looked upon rather as a skeleton of what may be done in the Firth of Clyde than as a perfect catalogue: a diligent collector might very greatly add to the number of species. I was so much taken up with other branches that I was unable to attend to the Tunicata as I should have wished. I saw many more species than those mentioned, but was obliged for want of time to leave them unexamined: this remark applies especially to the genera Leptoclinum, Botryllus and Botrylloides.

Fam. I. *Botryllidæ.*

Leptoclinum gelatinosum is to be found on Fuci and Laminariæ, at low water-mark, round the shores of the Isle of Cumbrae.

Diastoma variolosum. The Allans and other parts of Cumbrae, on Fuci in rock-pools, but not common.

Botryllus Schlosseri. This beautiful species is frequent "on stones and sea-weeds," at low water-mark, in those parts of the Clyde I have examined.

Botrylloides Leachii. Parasitic on Laminaria digitata, spring tide, the Allans.

Fam. II. *Clavelinidæ.*

Clavelina lepadiformis. Forbes and Hanley give Lamlash and Rothesay Bays as localities for this species, on the authority of Mr. Alder.

Fam. III. *Ascidiadæ.*

Ascidia intestinalis. This pellucid green species is common on dead Pectens, Cyprinæ, and other shells in the Coralline Zone: it is generally found on the inside of the valves.

„ venosa. I procured one specimen of this lovely Ascidia between Cumbrae and Bute, in fifteen fathoms water.

„ mentula. Frequent off Cumbrae, and in Lamlash Bays. From one specimen I extracted no less than eleven Crenella marmorata, some of them of large size, such as are not to be found elsewhere than on the west coast of Scotland.

„ arachnoidea. Lamlash, *Alder, Forbes & Hanley.*

Ascidia virginea. I met with several examples of this, as it were, blood-stained species, off Cumbrae, Lamlash, *Lands.* p. 34.

„ parallelogramma. A beautiful species; remarkable for the numerous star-like bright gamboge-yellow spots with which it is adorned; only one specimen occurred to me.

„ prunum. Common on various seaweeds growing in rock-pools, at extreme low water-mark, Allans, Cumbrae.

„ echinata. Very rare, deep water, off Cumbrae.

Cynthia rustica (*Ascidia rustica*). Dr. Landsborough mentions this species, under the name of Ascidia rustica, as having been dredged near the Corrigils, Isle of Arran, by Major Martin, *Lands.* p. 49.

Fam. IV. *Pelonaiadæ.*

Pelonaia corrugata. The Firth of Clyde can boast of having both the British representatives of this singular genus occurring in its waters; I took a single specimen of the present species off Shell Bay, Cumbrae, in about twelve fathoms.

„ glabra. "Dredged in seven fathoms water, in mud, Rothesay Bay," *F. & H.*

Div. II. LAMELLIBRANCHIATA.

Fam. I. *Pholadidæ.*

Teredo norvagica (*Teredo navalis*). The first notice of this species occurring in the Clyde district was that of Mr. Smith, who, in his Catalogue, published in 1838, recorded it as found in wood in the Clyde. It has since that time done great injury to the docks at Ardrossan, in which situation it was first found by Major Martin. I was enabled to procure some very fine, though dead, examples from a portion of the old dock-gates, which had been removed in consequence of the attacks of the Teredo. Dr. Landsborough writes of this species, "their strong calcareous tubes are not often seen more than a foot in length, but Mr. W. Thompson mentions that at Portpatrick they have, in some cases, attained the extraordinary length of nearly two feet and a half: the greatest diameter at the larger end is seven-eighths of an inch; at the smaller from one and a half to two lines. In these cases the valves of the shells were large in proportion, being three-quarters of an inch in diameter. The largest tubes I ever met with were found by me in a quarry at Content, near Ayr; they were in beams of timber like masts of vessels, which though still pretty firm, must have been buried there above twenty feet underneath the present surface, during some great convulsion, which must have taken place before a house of the town of Ayr was built, and at a period to which the history of Ayrshire does not extend."—*Lands.* p. 84.

Teredo megotara. This rare ship-worm is included in Dr. Landsborough's list of Arran Mollusca.

Xylophaga dorsalis. Abundant in and around Ardrossan docks, in company with Teredo norvagica. Major Martin sent specimens from this locality to Mr. W. Thompson, who, in 1847, published an interesting account of the species in the 'Annals of Natural History,' (*vide* also 'F. & H.' vol. i. p. 93). There is a good specimen of the Xylophagæ, *in situ*, from Ardrossan, in the British Museum. Mr. Hennedy states that "Xylophaga dorsalis was found last year (1851) when Gourock Quay was repairing: it inhabited the piles, and, along with Limnoria terebrans, had completely destroyed the portion under water. Timber, thoroughly perforated with these pests, is often cast ashore in the vicinity of Gourock."—*The Naturalist*, vol. ii. p. 88. While the Teredo norvagica bores *with* the grain, penetrating into the very heart of the wood, the Xylophaga bores *across* the grain, and rarely excavates deeper than an inch from the surface.

*Pholas dactylus. Clyde (*Smith*), *F. & H.*

* „ crispata. Bute, Clyde, *Smith*. It is far from rare in Lamlash Bay, where it may be found near low water-mark by turning over the pieces of shale and examining them for its excavations. It usually bores from beneath upwards, and when it has perforated the stone through to the upper side, which it does, as the stones are not very thick, it dies. It does not grow to a large size in this locality; my finest specimen does not exceed an inch and three-quarters in length. "Pholas crispata occurs plentifully in clay at the Castle and in several places further down the Clyde."—*Hennedy*, '*The Naturalist*,' vol. ii. p. 88. On one occasion I observed two or three Pholades burrowing in the Red Sandstone, just west of Kames Bay, Isle of Cumbrae: having no instrument with me I could not then procure them, and left them hoping to return another day and extract them; unfortunately, however, I neglected to mark the exact spot, and although I many times searched I never again fell in with them. From the view I had of the siphons, I believe these individuals to have been crispata, but of this I cannot speak with certainty.

Fam. II. *Gastrochænidæ.*

Saxicava arctica (*Hiatella arctica, minuta* and *præcisa, Anatina arctica*). This species is frequent in all parts of the Clyde district, and may be taken either by the dredge, or in rock-pools among the roots of Corallina.

* „ rugosa (*Saxicava Pholadis*). In similar situations to the last, but more common.

Fam. III. *Myadæ.*

*Mya truncata (*Mya ovalis, Sphenia Swainsoni*). Is common in most of the sandy bays throughout the district. Specimens, in fine condition and of very large size, may be found cast up in abundance at Fintry Bay, Cumbrae, after storms. Specimens from this locality sometimes measure three inches long and two and a half inches wide. Dr. Landsborough mentions the variety named uddevalensis as found in Lamlash Bay.

* „ arenaria. This is a far more local species in the Clyde district than is the last. It occurs in Lamlash Bay, and Mr. Alder has met with it "at Rothesay Bay, where both this and truncata are used by the fishermen for bait," *F. & H.*

*Panopæa norvegica (*Panopæa Bivonæ*). This is an abundant fossil in the glacial beds. Dr. Landsborough says, "the first specimen ever got in Scotland of Panopæa norvegica was found on the shore at Fintry Bay, Isle of Cumbrae, and probably from the post-tertiary deposits."—*Lands.* p. 420. The shells found in this deposit are in such beautiful preservation that they might easily be mistaken for recent examples. The specimen in my cabinet, for which I am indebted to Mr. Smith, is from the Kyles of Bute, and has the epidermis still on: I have seen such specimens placed in cabinets as recent; but the Panopæa has never, I believe, been taken alive on the west coast.

Fam. IV. *Corbulidæ.*

*Corbula Nucleus (*Corbula striata*). As far as my observations go, this is a somewhat scarce shell; I have taken it between the Cumbraes, and it likewise occurs in Lamlash Bay, but in neither of these places does it appear to be gregariously abundant, as it is often met with elsewhere.

Sphenia Binghami. Included in Dr. Landsborough's list of Arran

Shells, and Mr. MacAndrew has likewise taken it in the Firth of Clyde.

Neæra cuspidata (*Corbula cuspidata*). Has been taken off the Isle of Bute by Mr. Smith, of Jordan Hill.

Fam. VI. *Apatinidæ.*

Thracia phaseolina (*Thracia declivis, Anatina declivis*). Very sparingly distributed: it occasionally occurs on the shores of Arran and Cumbrae, in the Laminarian Zone. A series is in the British Museum, from Saltcoats.

„ villosiuscula (*Anatina villosiuscula*). Much more frequent than the last. It is mentioned by Mr. Smith as taken at Bute, but altogether omitted by Dr. Landsborough, who may have confounded it with the last, or taken it for the young of the following. I have dredged it off Largs, to the west of Cumbrae, and fine and frequent in Lamlash Bay.

„ pubescens (*Amphidesma pubescens, Anatina pubescens*). I have never met with this shell in the district: it is mentioned by Mr. Smith and Dr. Landsborough, but this is not a part of Great Britain in which we should have expected to meet with the species. May not villosiuscula have been mistaken for the young of this species, and hence its insertion in the catalogues referred to?

„ convexa (*Amphidesma convexa*). Ayr, *Smith*. "Single valves have been found at Arran (Al der)," *F. & H.*

„ distorta. I took two full-grown and many young specimens of this Thracia from the roots of Corallina officinalis, growing in rock-pools at Clachland Point, Arran.

Cochlodesma prætenue (*Anatina prætenuis, Mya prætenuis*). A somewhat local species, though found in many spots: I have taken it in Lamlash Bay and to the south-west of Cumbrae, though very sparingly: it is more frequent, however, off Largs. Ayr, Bute, *Smith.*

Fam. VII. *Solenidæ.*

Solen marginatus (*Solen vagina*). "It is enumerated by Mr. Smith among the shells of the Clyde; but, if a Scottish shell, is certainly a very rare and local species," *F. & H.* I wrote to ask Mr. Smith whether he could give me any further particulars respecting this and some other species, and whether he could tell me the exact locality where it occurred, and if it appeared to be firmly established in its habitat; but, unfortunately, Mr. Smith's dredging-book having been lost, he is unable to give any further information respecting its locality.

*Solen siliqua is found at Lamlash, and is cast up frequently after storms in Kames Bay, Cumbrae. The specimens from this last locality are remarkably fine; an example in my cabinet measures eight and a half inches long and one and a half wide, dimensions considerably exceeding those given by Forbes and Hanley, and to which it is said by them rarely to attain.

* „ ensis. Common in suitable localities, and attains a very large size: those in my cabinet from Fintry Bay, Isle of Cumbrae, where it is found cast up in abundance after storms, measure six and a half to seven inches in length, and an inch in width, nearly double the size of ordinary specimens. "Spout-fish" is the name by which the Solens are known in this part of Scotland.

„ pellucidens (*Solen pygmæus*). Ayr, Bute, *Smith.* I have taken it in deep water just outside Lamlash Bay, off Clachland Point, and to the west of Cumbrae, between Fintry and Shell Bay, but it is scarce.

Fam. VIII. *Solecurtidæ.*

Solecurtus coarctatus (*Solen antiquatus*). I have not met with this species; but it is undoubtedly a native of the Clyde, as it occurs in the lists of both Mr. Smith and Dr. Landsborough.

Fam. IX. *Tellinidæ.*

Psammobia vespertina. The Setting Sun is very abundant in Loch Ryan to the south of the district to which this catalogue refers. In the district itself I have not found it, nor is it mentioned among the Clyde shells by Mr. Smith, or those of Lamlash Bay by Dr. Landsborough. It appears, however, to occur at Loch Ranza, which is at the northern extremity of Arran, as there are two specimens in the British Museum labelled as from that locality, and presented by the Rev. D. Landsborough.

„ Ferroensis. Ayr, Bute, *Smith.* I have taken it in Kames Bay, Cumbrae, and at Lamlash, but only procured a specimen or two from each locality.

„ tellinella (*Psammobia florida*). Occurs occasionally in the Coralline Zone on the west of Cumbrae and in Lamlash Bay. Its colours in this part of Great Britain have not the brilliancy which makes this such a lovely shell when taken further south; at Herm I have met with snow-white specimens, and one of an uniform dark purple.

Psammobia costulata. Ayr, *Smith.*

*Tellina crassa. Ayr, *Smith;* Lamlash Bay, *Lands.* I have dredged it in the laminarian zone, Shell Bay, Cumbrae.

„ donacina. This beautiful shell, which seems to have its head quarters in the west of Scotland, is found frequently in such parts of the Clyde as are suitable for it, in twelve to fifteen fathoms water, among nullipore and comminuted shells.

„ incarnata (*Tellina depressa, Tellina squalida*). Although I have taken many single as well as two or three double valves of this shell between the Cumbraes and in Lamlash Bay, they have all been evidently so long dead as to lead me to regard them rather as post-tertiary fossils than as recent shells, although they may have been the latter. Mr. Smith, however, mentions it as found at Ayr and Bute; and Dr. Landsborough has met with it in Lamlash Bay, in which last locality it has also been taken by Mr. Alder.

* „ tenuis. Is very common in the sandy bays, mostly white, occasionally pale pink or yellowish, but I have never met with crimson specimens in the Clyde.

„ fabula. Local in its distribution: Kames Bay, Cumbrae, is a prolific source; it is found there in some numbers among the fine sand, with which the dredge comes up filled.

„ solidula. Lamlash Bay, *Lands.*

Syndosmya alba (*Amphidesma Boysii, Amphidesma album*). Arran, Bute, &c., *Smith;* Lamlash, *Lands.* I have likewise taken it off Cumbrae.

* „ prismatica (*Amphidesma prismatica*). Dr. Landsborough records this among the Lamlash Bay Mollusca.

„ tenuis (*Amphidesma tenue*). Introduced into Mr. Smith's catalogue without any locality affixed: as his list embraces the arm of the sea right away to the coast of Ireland, it *may* find its place in the list from having been found on the latter coast; I have, however, taken it in Lamlash Bay: it appears scarce.

Scrobicularia piperata (*Lutraria compressa, Amphidesma compressa*). Bute; Ayr, *Smith.* It is recorded by Dr. Landsborough as found at Arran.

ALFRED MERLE NORMAN.

Kibworth, Leicestershire,
May 28th, 1857.

(To be continued).

List of the Podophthalmous Crustacea occurring in Dublin Bay and the adjacent Waters. By JOHN R. KINAHAN, M.B., M.R.I.A., &c., &c.

THE value of local lists is now generally acknowledged. The following, therefore, needs no apology. All the species, with a very few exceptions noted, have occurred, living, to myself; and most of them, including that rare crab, Perimela denticulata, have been under my observation in the vivarium for a considerable time. The district in which they occurred includes the seaboard between Bray Head on the South and Skerries on the North; but the majority of the species have occurred in the bay between Dalkey Island and Howth. This district comprehends the following localities:—Merrion, a clear, open sand, with a few sand pools; Salt Hill and Sandycove, rocks with rock pools, and a limited Zostera-clad sand bank; Dalkey Sound, a rocky channel, in some parts muddy bottom, in others shingle, and in others a clear sand and nullipore, a strong tide running through it. This affords almost all the species noted, many of the deep-sea species being taken here, especially in the spawning season, in six to eight fathoms water. None of the other localities call for note, except the Scallop Bed, which is a sandy bank, lying about nine miles from shore off Bray, with from nine to fifteen fathoms water on it.

Long-legged Spider Crab (*Stenorhynchus Phalangium*, Penn. sp.) Common in laminarian and coralline zones. Sometimes thrown ashore after high gales, entangled in masses of zoophytes. Many specimens agree in part with the details of S. tenuirostris: these are chiefly from the deeper waters. Local name "Spiders." In ova in January.

"Scorpion Spider Crab" (*Inachus dorsettensis*, Leach). Not common. Found entangled in the fishermen's lines off Howth; also dredged in Dalkey Sound, and off Bray Head.

Inachus Dorynchus, Leach. Not uncommon. In shallower water than last, and occasionally drifted in after gales.

Great Spider Crab (*Hyas araneus*, Linn. sp.) Very common among rocks beneath overhanging sea-weed near extreme low water. Large specimens from the fishermen's lines when set in the shallow waters. Dredged in tidal streams abundantly. Local name "Tinker." In ova in February; exuviates in March.

Hyas coarctatus, Leach. Very common, being abundant in the whelk pots and on the long lines, but an inhabitant of much deeper water than H. araneus. This species grows to a very large size here, but, being an inhabitant of deep water, large specimens are not frequently met with. I find this species dies sooner in a tank than the last. The larger specimens appear not to change their carapace annually, zoophytes, barnacles, Anomias, Serpulæ, and even oysters of large size, being found attached not merely to the exterior of the carapace, legs, &c., but even internally on the surface of the prælabial space. The bifid extremity of the rostrum frequently has its cornua crossed. This was first pointed out to me by W. S. Macnally, Esq. I have found it since of frequent occurrence, and generally accompanied, and probably caused by, the growth of a sponge. Local name "Tinkers." In ova in February; exuviates in January.

Strawberry Crab (*Eurynome aspera*, Leach). Rare. Two specimens were obtained from twenty-five fathoms water off Bray Head. Many years ago abundantly obtained on the shore near Malahide. Specimens in the Museum of the Dublin Natural History Society, thence obtained, were presented by Dr. Lloyd to the collection of that Society.

Great Crab (*Cancer pagurus*, Linn.) Excessively common in suitable localities. Essentially littoral in its habits, and seldom taken in the dredge. One dredged between the valves of a dead oyster-shell, in about twelve fathoms water, in Dalkey Sound. Local name "The Crab." This is the only species eaten here. In ova in April.

Hairy Crab (*Pilumnus hirtellus*, Linn. sp.) Rare. Some years ago this crab was washed ashore in numbers near Portmarnock. I obtained a small specimen under a stone in a rock-pool at Sandycove, near Kingstown, 1857, and have met with remains of the animal near the Pigeon House Wall. It does not occur here in anything like the abundance in which it is met with at Galway.

Pirimela denticulata, Mont. sp. The only Dublin specimen of this crab I know of was dredged by me in Dalkey Sound in twelve fathoms water, May 2, 1857; it was a small female, and in ova; the zoeas resemble very closely those of Cancer pagurus. In ova in May. This species lives well in confinement, and is extremely active in all its movements.

Common Shore Crab (*Carcinus Mænas*, Penn. sp.) Excessively common. Essentially a littoral species. The young, especially from brackish water, vary much in colour, from a dead brickdust-white to almost purple; the ordinary colour of the species is, however, green: one adult specimen, three inches in diameter, had the fingers and upper part of hand nearly pure white, the tips of the claws excepted, contrasting most curiously with the rest of the animal. I find that the adults do not change their carapace annually. They may be found covered with barnacles of considerable size, and you also find their claws worn in a way you never see in the junior specimens. I have seen the teeth of the fingers worn quite smooth, especially those of the grasping claw. In the young specimens there is no distinction between them. Local name "Green Crab," "Soft Crab" when just exuviated, in which state they are largely used as bait.

Variegated Swimming Crab (*Portumnus variegatus*, Leach). In certain districts after easterly gales this species occurs rather plentifully. I have never dredged nor met with it in any quantity under other circumstances.

Velvet Swimming Crab (*Portunus puber*, Linn. sp.) Common among rocks in laminarian zone. Seldom captured in the dredge, though tolerably frequent in the lobster and crab pots. The young are curiously variegated. Many of the adults are nearly quite flat. In ova in March. Local name for all the Portuni, "Tailors."

Wrinkled Swimming Crab (*Portunus corrugatus*, Penn. sp.) Very rare. I have never met but one, and that a very young specimen, in strand pools near Merrion, after a heavy gale from the East, November, 1854.

Arched-fronted Swimming Crab (*Portunus arcuatus*, Leach). A single specimen at same time as last. The same remarks apply.

Cleanser Swimming Crab (*Portunus depurator*, Leach). Local. Probably only an inhabitant of the deeper zones. Occurs on the long lines, and also in the dredge, on the scallop beds. In ova in March.

Livid Swimming Crab (*Portunus holsatus*, Fabric.) Not rare. Occurs on Merrion Strand in some numbers after easterly gales; also dredged in extreme laminarian zone, on sandy bottoms. A curious wrinkled variety of it occurs in Dalkey Sound, which may be confounded with the young of P. depurator. This may prove to be a separate species, but I think not. In ova in March.

Dwarf Swimming Crab (*Portunus pusillus*, Leach). Very common in suitable localities in laminarian and coralline zones. In ova in February.

Common Pea Crab (*Pinotheres pisum*, Penn. sp.) Excessively common. Nearly every Mytilus and Modiolus from the laminarian and coralline zones contain this crab. The females much more numerous than the males. Both sexes rarely present together.

Common Nut Crab (*Ebalia Pennantii*, Leach). Rare; probably, rather, not found. Bray, Dalkey Sound. In ova in April.

Circular Crab (*Atelecyclus heterodon*, Leach). Rare. Three small specimens of this species occurred to me in 1854, along with P. arcuatus and P. corrugatus. It is apparently an inhabitant of comparatively deep water.

Mask Crab (*Corystes Cassivelaunus*, Penn. sp.) Sandy beaches after gales, also deep-sea lines. Not uncommon. In ova in March.

The following species are recorded as having occurred in Dublin Bay, but have not come under my notice living.

Florid Crab (*Xantho florida*, Leach). Very doubtful. Most probably an error.

Angled Crab (*Gonoplax angulatus*, Fabr. sp.) Though I have never met this crab recent, yet there are many well-authenticated specimens of it from Knockagin, Co. Dublin, in the University collections, Trinity College, as well as in private collections. Local name "Coffin Crab."

Cranch's Nut-crab (*Ebalia Cranchii*, Leach.) The late lamented Doctor Robert Ball showed me a specimen of this crab taken by himself, many years ago, on the Dublin coast, I think in Dalkey Sound.

John R. Kinahan.

Donnybrook, Dublin,
May, 1857.

Note on Carcinus Mænas.—A few days since I observed a small shore crab (*Carcinus Mænas*), in my aquarium, devouring one of his own species of less dimensions; so far there was little to remark, but I was struck by the circumstance that both the claws of the victim were gone, and, as none of his eight legs were injured, it seemed highly probable that the conqueror had deprived the vanquished of his weapons, that he might finish his meal in peace. Perhaps others can tell whether this scientific proceeding is usual among crabs.—*George Guyon; June* 15, 1857.

Hybernating Larvæ feeding on Moss.—A friend of mine, residing at Crewe, who paid me a visit the other day, mentioned in conversation the following circumstance, which may be of use to other entomologists who may have a brood of hybernating larvæ:—He said, while beating for larvæ late last autumn, on passing a bed of Epilobium hirsutum, he beat some of the plants over his umbrella, and, upon examination, found a number of young Noctua larvæ: he took a few home, and placed them in a breeding-cage, where he had some pupæ covered over with damp moss; when the weather became cold he placed the cage against a wall, behind which was a fire, belonging to a neighbour, that was seldom allowed to go out night or day, consequently the wall was always warm. The moss was always kept damp, and one night, on looking in, he found the larvæ crawling about, and greatly increased in size; he continued to look at them when going to bed, and found them feeding upon the moss; they ultimately changed, and came out in the beginning of last month (if I recollect right) C. nigrum. As there is often much difficulty in keeping larvæ alive through the winter, it might be worth while to try other species with moss, by keeping them in a green-house.—*James Cooper; Museum, Warrington, May* 24, 1857.

Capture of Deilephila Euphorbiæ near Box Hill.—In close proximity to a favourite nook for Toxocampa Pastinum, I espied the above rarity at rest on a fence, on the 5th of July, and I was not long in boxing him: it is, I believe, the first specimen ever taken in that neighbourhood. Within half-an-hour I succeeded in capturing six specimens of T. Pastinum, when a continuation of smart showers stopped collecting. Polyommatus Alsus was abundant, as was also Arge Galathea. I visited the same ground on the 6th, but without success. I tried the sugar-pot up to a late hour for P. leucophæa, but he would not come out; so that, after boxing about half a gross of small fry, I returned to the "land of smoke."—*James Gardner; 52, High Holborn, London.*

Locality of Gastropacha Ilicifolia.—In answer to your question (Zool. 5629), I beg to say that all the specimens of Gastropacha Ilicifolia that I bred were from larvæ that I found on Cannoch Chase: I also found one' pupa in the same locality. In one of the pupæ was a pupa of some large Ichneumon, but it has not yet showed itself out.—*Richard Weaver; Post Office, Rugeley.*

Locality of Gastropacha Ilicifolia.—I bred my Gastropacha Ilicifolia from some larvæ that I took on Cannoch Chase.—*F. Bonney; Marlborough College, Wilts.*

Locality of Gastropacha Ilicifolia.—I took the pupæ of those specimens of Gastropacha Ilicifolia that I bred on Cannoch Chase.—*Edward S. Bonney; Churchdale House, Rugeley.*

Silkworms feeding on the Oak.—The Impérial Société d'Acclimatation, at Paris, has received from one of its members, the Bishop of Manchouria, 300 cocoons of the silkworm living on the oak tree in the North of China. These silkworms vary greatly, especially as regards climate, from those on the Indian oak tree, of which the Society has established already a little colony at the villa of one of its members, M. Chavannes, at Lausanne. Just at this moment, when the mulberry-tree silkworm is so much visited by disease, this new oak silkworm from Manchouria, which, it is expected, will thrive in the northern parts of France,—and probably in England,—is of the highest importance.—*The Morning Star, May* 25, 1857.

Cucullia Chamomillæ.—This species I have again bred, from larvæ obtained last summer: the first specimens appeared on the 28th of February; these were brought forward by heat, the pupæ having been placed in a parlour-cupboard, where there is a chimney: by this method I reared the whole, whereas the average is two-thirds from pupæ.—*J. J. Reading; Wyndham, Plymouth, May* 20, 1857.

Captures at Street-Lamps.—Two specimens of Drymonia Chaonia have come to my share, one on the 11th and the other on the 19th of May. On the 17th of May, when looking after D. Chaonia, Peridea trepida made its appearance, and I took a fine male specimen, measuring 2⅜ inches.—*Id.*

Ennomos illustraria, var. *sublunaria*.—A few entomologists still believe the summer brood of this insect to be a distinct species from the spring brood, because the size and colour are so different. On the 9th of May, 1856, I took at a gas lamp a female illustraria that deposited nearly one hundred eggs; they produced larvæ, from which I reared the perfect insect in July and August following; they were of the *var.* known as sublunaria: a female of this brood also presented me with eggs that produced larvæ, that, late in autumn, turned to pupæ, from which, on the 18th of March, 1857, the first two emerged perfect insects, and they are true *fac-similes* of their grandpa and grandma of the spring, 1856. Another remarkable feature in the history of this species is the very uncertain periods at which their changes take place; for instance, some of the pupæ that were the produce of last year's vernal females did not produce the perfect insect at the same time as the remainder of the brood, but continued in the pupa state until the 21st of March, this year; therefore this one species is an example of both single and double-broodedness.—*Id.*

Eupithecia cognata and E. subfulvata bred from the same batch of Eggs.—Within the last week I have bred both Eupithecia cognata and E. subfulvata from eggs deposited last year by a specimen of E. subfulvata; thus proving beyond a doubt, were proof still wanting, the entire identity of these two supposed species. It is worthy of remark, however, that there is not a specimen of succenturiata among them, nor has the insect, to my knowledge, been found in this district.—*R. F. Logan; Duddingston, Edinburgh, July* 3, 1857.

Capture of Abraxas Ulmaria at West Wickham.—A specimen of this insect was taken by Mr. J. Fancourt, at West Wickham, on the 27th of June. I had the pleasure of seeing the specimen alive.—*C. B. Newman; 7, York Grove, Peckham, July* 18, 1857.

Varieties of Abraxas Ulmaria, &c.—For many years past I have given great attention to the varieties that occur in different species of Lepidoptera, with what success entomologists who have seen my specimens are best able to judge. The above species, although extremely abundant for years, appeared to be a species not given to great variation: during the last two or three years, a few appeared of a pure white colour, void of the lead-coloured markings almost invariably present: this season two specimens have occurred of a beautiful slate colour, giving the specimens a most striking appearance. Grossularia has also been bred void of all black markings, and the yellow scarcely visible; in fact, almost an albino. Leucophæaria I took in spring, all gradations from gray to entirely black; the female varies precisely the same. Pilosaria is also extremely variable.—*R. S. Edleston; Bowdon, June* 8, 1857.

Notes on Tineina.—Batodes Angustiorana and Pœdisca occultana. I have bred these species lately; the former on yew trees, the latter on larch.

Plutella sequella. During the last few days I have bred this charming species from white cocoons found on the boles of oaks in Dunham Park.

Crambus falsellus is not uncommon this season, but very local: the only time to take them is just before dark.

Tinea corticella. For some weeks past specimens have been constantly appearing on a dead branch of an oak near to my house.

Nepticula myrtillella, *Edl.* From the cocoons mentioned in the 'Zoologist' (Zool. 5406) I have bred a few of the moths during the last few days. Head and face orange, palpi white, antennæ fuscous, basal joint white; anterior wings fuscous, with a faint violet tinge, beyond the middle is an oblique slender whitish fascia, slightly interrupted with fuscous scales; cilia yellowish white; posterior wings pale gray.

From the Nepticula cocoons collected last autumn I have bred some hundreds of these little gems: Septembrella and subbimaculella emerged in swarms; apple, oak, hornbeam and hawthorn cocoons produced their tenants in a satisfactory manner; with precisely the same treatment few have emerged from rose, hazel, sloe, birch, elm and mountain ash. Regiella made its appearance this morning from hawthorn. At the close of the season I will send to the 'Zoologist' a list of the species bred.

Vaccinium Vitis-Idæa. From larvæ feeding in this plant I have bred Coleophora vitisella (the males are very like orbitella), Euchromia flammeana, Anchylopera myrtillana and Lithocolletis vacciniella. In the course of a few days I expect to see Nepticula Weaveri, Coccyx ustomaculana and two species of Coleophora; the latter appear to be very scarce,—I met with but two cases of each.

Lithocolletis Klemannella. I bred two from alder; and Ornix Scoticella from mountain ash. During the last few days I have taken a few specimens of Lampronia luzella and rubiella flying in the afternoon amongst raspberry bushes.—*Id.*

The Tzetze of Africa identified with Œstrus Bovis.—A considerable degree of uncertainty and even misapprehension appears to prevail about the fly that Dr. Livingstone so interestingly describes as annoying the cattle in Africa, and which he designates the *tzetzes*, its African appellation. Although introduced as a new species, I beg to observe that it is a very old one under a new name,—the fly so feelingly described by Moses of old as infesting the cattle of Egypt, and by Isaiah, the prophet, as being very troublesome in his day; and after these the heathen writers and poets, especially of Rome, do not fail to notice it,—"Est lucos Silari circa," &c. The fly itself, the cause of this trouble, has been exceedingly scarce; so much so that Valisneri, an Italian writer on the subject, had never seen but a mutilated specimen of it, nor had Réaumur, a French writer, and Linneus himself had never seen one, and, throughout all the editions of the 'Systema Naturæ,' he has, by a strange oversight, given a horse-bot for it. It has been my good fortune to get no less than five specimens of this fly; two I obtained when living at Moulsey, near Hampton Court, by fixing a pitch-plaister on the loins of two cows, on Moulsey Common,—the plaister having a hole in the centre, in which was fixed a gauze-pouch, into which the larva fell on making its exit from the cow's back: in this way I obtained two full-grown grubs, which, put into a garden-pot of earth, brought me two perfect and lively flies; one flew out of a window while I was looking at it, the other was drawn by Sydenham Edwards for representation in the third volume of the Linnean Society's 'Transactions:' a third I caught in a journey in Savoy, on Mont Blanc, with the ingenious Peter Huber, whose labours among the bees and ants have lately so eminently distinguished him; it was flying about some cow-dung, and on seeing it my agitation to secure it was so great that Huber said, "Let me try," and with a sweep of his hand he caught it; I gave this specimen, on my return from Switzerland through Germany, to the celebrated Professor Daniel Schreber, of Erlang, the pupil and friend of Linneus, till then had never seen a specimen of it: a fourth I saw, among a number of other insects, in a shop-window in Paris, and, purchasing it for a franc, gave it to young Wm. MacLeay, a devoted naturalist. Now this African *tzetze*, I am led to believe, is the real patronymic of the French *Estre*, made more pronounceable by introducing more vowels and fewer consonants, and then from it we get the Latin *Œstrus* and the

Greek *Oistron*, and so forth, all meaning the same cattle-frighting object noticed by all: and so terrific is the fright that the cattle will run away with their plough even through the opposing hedge rather than submit to their infliction; and yet, what is most singular, they possess no weapon of infliction, but simply a telescopic sort of tube for thrusting the egg down upon the skin, which hatching there, the tiny grub gnaws its way through the skin and forms its nidus there in a comfortable abcess, leaving its abode when fully grown, and tumbling to the earth becomes a chrysalis and next a fly, which goes forth to perform this strange round of events, the object of which appears to be to save the poor cow and ox from the effects of idleness and repletion, which, in those sunny regions, they would be so exposed to, if not roused into activity and leached and blistered in this way. Such are the ways of Providence, meant in kindness no doubt. It is the *susurrus*, or whistle they make that frightens the cattle, and not the infliction. And what is too remarkable to be omitted, we learn from that very ancient poet Avienus, that these Isles, abounding in forests, wild cattle and these flies, were known by the name of *Œstrimerides* before they obtained from the Romans the name of Britannia.—*Bracy Clark*; 18, *Giltspur Street*, *London.*

Description of the Male of Megastigmus Pinus.— Having been furnished with some more of the Pinus seeds, such as produced the female described some time ago (Zool. 5548), I have been fortunate enough to breed a male specimen; I therefore give a description of it, so as to complete the species:—Yellow; the eyes and tips of the mandibles ferruginous; antennæ black; the scape honey-yellow; the flagellum with a pale yellow line along the back. Prothorax subquadrate, the collar with three minute ferruginous dots above: base of the prothorax with a green transverse stripe and a triangular blackish macula; an angular spot above the tegulæ, also a triangular spot on the scutellum, black. Wings beautifully iridescent, the stigma and nervures black. Abdomen honey-yellow, the upper surface with an interrupted broadish black line. Legs pale yellow, the claws of all the tarsi ferruginous. Length 1¾ lines; expanse of wings 3 lines.—*Edward Parfitt*; 4, *Weirfield Place*, *St. Leonard's*, *Exeter*; *July* 10, 1857.

Capture of Dyschirius impunctipennis.— I have again met with Dyschirius impunctipennis, *Daw.*, and have taken about seventy specimens. Let those who want it write to me,—not to exchange a "black dog" for a "monkey," as I prefer giving insects and having them given to the huxtering system which seems so much in vogue now. Of course I shall supply old friends first, and any one who does not hear from me may conclude my stock is exhausted.—*C. S. Gregson*; *Stanley*, *June* 9, 1857.

Occurrence of Carabus intricatus near Plymouth.—When digging for insects, a few days since, in the neighbourhood of Plymouth, I had the good fortune to find three fine and perfect specimens of Carabus intricatus and the mutilated remains of a fourth. These insects vary much in colour, some being tinged with resplendent blue and violet, whilst others are dull and nearly black.—*John Gatcombe*; *Wyndham*, *Plymouth*, *May* 18, 1857.

Description of an uncharacterized British Anthicus.

ANTHICUS SCHAUMII.

A. ater nitidus confertim punctulatus et cinereo-pubescens, capite magno postice valde quadrato, antennarum basi tibiis tarsisque plus minus rufescentioribus. (*Long. corp. lin.* 1¼.)

Anthicus ater, *Steph.* [nec *Panz.*], *Ill. Brit. Ent.* v. 74 (1832).
" " *Steph., Man. Brit. Col.* 341 (1839).

Deep black, shining, more or less densely clothed with a fine, decumbent, cinereous pubescence, and rather coarsely punctulated all over,—the punctures on the prothorax, however, being smaller, and those on the head somewhat less numerous, than elsewhere. Head large and square posteriorly,—its hinder margin being almost straight,—and with a tolerably distinct central line. Elytra sub-parallel and immaculate. Antennæ at base, tarsi and generally the tibiæ more or less ferruginous; antennæ at apex obscurer.

The present little Anthicus, which is abundant at the Chesil Bank, near Weymouth, has been the subject of a good deal of confusion, as regards its synonymy. By both Stephens and Curtis it was referred to the ater of Panzer, from which, however, it is totally dissimilar,—the latter species being immensely larger, of a different form and sculpture, much less pubescent, with its feet alone ferruginous, and peculiar to Northern Europe. By Dr. Schaum, when he was in England, in 1847, it was inadvertantly identified with the fenestratus of Schmidt; but, as he had not a specimen of Schmidt's insect with him at the time to compare it with, it is not surprising that he should have since altered his opinion concerning it. Having been lately examining the Anthici, with particular reference to the determination of an allied representative which abounds on the mountains of Madeira, and which I had supposed to be identical with the British one, and not feeling satisfied that either of them was precisely coincident with the fenestratus of Mediterranean latitudes, I communicated afresh with Dr. Schaum on the subject, and have received from him typical examples of the fenestratus, collected in the South of France. The result is, not merely that the English and Madeiran species have been proved to be distinct from the fenestratus, but also distinct *inter se*, and moreover (as it seems to both of us) new, being apparently undescribed in Laferté's monograph; and the former of them I have therefore great pleasure in now dedicating to him. It recedes from the fenestratus in being more shining, of a much deeper black, and quite immaculate, there being no indication of a paler humeral patch (though the silvery pubescence with which it is clothed does occasionally cause the shoulders, from their prominence, to seem just perceptibly lighter than the rest of the surface); in its elytra being a little more parallel at the sides (or less oval), and with scarcely any appearance of the postmedial impressed line, on either side of the suture, which is there so broad and conspicuous; by the punctuation of its head and prothorax being less dense, and much better defined (there being no admixture of the elevated points or granules, which so thickly beset those parts in that insect); and by its limbs being of an obscurer hue. It used to occur in profusion beneath stones on the Chesil Bank; but I have not myself observed it in any other locality.—*T. Vernon Wollaston.*

Chrysomela cerealis.—On the 5th inst., during a long hunt on the Llanberis ascent to Snowdon, accompanied by one of my boys, he had the good fortune to find two specimens of this beautiful beetle (male and female) under separate stones. We also found elytra and fragments of at least three other individuals, all confined to a small space below the road over the west side of Glyder, a little above the latter. The various species or reputed species of Geodephaga proper to the locality were in great plenty, with the exception of Carabus glabratus, of which we did not see any trace, probably being too early in the season for it.—*J. Hardy; Radnor Street, Hulme, Manchester.*

The Aquarium.—The aquarium described in the 'Zoologist' (Zool. 4957) was cleared out the other day, to clean the glass, the contents not having been changed for two years and three-quarters, fish being in it at the latter part of the period. During an absence of seven months the newt, beetles and mollusks lived on, without any feeding or attention beyond the addition of a little water, to make up for the loss by evaporation.—*George Guyon; June* 15, 1857.

PROCEEDINGS OF SOCIETIES.

ZOOLOGICAL SOCIETY.

Tuesday, May 26, 1857.—Dr. GRAY, F.R.S., V.P., in the chair.

Mr. Bartlett read a paper on the Chinese sheep, describing and referring to specimens presented to the Society by H.R.H. Prince Albert, to whom they were sent from China by Rutherford Alcock, Esq., H.M. Vice-Consul at Shanghai. The most important feature with regard to these sheep is their great fecundity. The three ewes in the Society's gardens having produced thirteen lambs in the spring of the current year. Mr. Bartlett having submitted specimens of the wool of these sheep to the Council of the Chamber of Commerce for the worsted district of Bradford, read the Report of Dr. Price to that board upon it, which was favourable as to its quality for certain branches of manufacture.

The Secretary read a paper communicated by Mr. Cuming, containing descriptions of thirty-one new species of land shells by Dr. L. Pfeiffer.

Dr. Gray read a paper on the animal and bark of the genus Antipathes. In the Proceedings of the Society for 1832, he described for the first time the bark and animal of Antipathes dichotoma, from Madeira. He observed that this species had been separated from the others of that genus because the surface of the axis is smooth and not covered with a number of minute uniform cylindrical spines, like the true Antipathes, and has been called for that reason Leiopathes, and it has been further stated that, although Leiopathes has a distinct bark and animal like the Gorgoniadæ, this may not be the case with the normal species of the genus. Dr. Gray had failed to discover any traces of a bark or any kind of animal matter in the various specimens examined by him until a few days since, when Mr. Samuel Stevens laid before him a very fine specimen of Antipathes from the Sechelles, which was entirely covered with a very distinct bark or animal covering.

Tuesday, June 23, 1857.—Dr. GRAY, F.R.S., V.P., in the chair.

Mr. Sclater read a paper containing descriptions of twelve new or little known species of the South American family Formicariidæ.

Mr. R. F. Tomes communicated a paper on two species of bats inhabiting New Zealand. The first notice of the occurrence of Cheiroptera in New Zealand was given by Forster in 1772—74, who recorded the occurrence of a bat flying over the sea-shore near the margin of a wood in the estuary of Queen Charlotte. It was shot, but being struck only in the wing, lived for two days. To this species Forster gave the name of Vespertilio tuberculatus. Having some time since had occasion to examine some species of bats in the Museum of the College of Surgeons, Professor Quekett showed Mr. Tomes one which had been recently received from New Zealand. It was not until he had been assured that it came directly from that country that he could be persuaded that no mistake as to the locality had been made, the example being so entirely unlike the only New Zealand species he had seen. Mr. Tomes shortly afterwards inspected three of this supposed new species in the Leyden Museum; and finally he detected five other examples in the British Museum. Being thus satisfied of the existence of two species of bats in New Zealand, he was anxious, if possible, to determine to which of these Forster had given the name of V. tuberculatus. The kindness of Dr. Gray speedily placed in his hands all the necessary materials. There could be no hesitation, the supposed new species was undoubtedly that from which Forster's drawings had been made, whilst the description indicating the number of incisors, and other peculiarities, pointed unequivocally to the same conclusion.

The Hon. E. Chitty read a paper on the Jamaican species of Cyclotus, and the descriptions of twenty-one proposed new species and eight new varieties of that sub-genus from Jamaica. The new species and varieties were exhibited to the meeting.

The Secretary read a paper by Dr. Gray containing the description of a new species of antilope from Bombay, lately living in the menagerie of the Society; it was characterized under the name of Oryx Beatricis.

The Secretary also read a paper by the same author, containing descriptions of two new genera of Gorgoniadæ; they were named Sarcogorgia and Subergorgia.

The Secretary then read a paper by Mr. A. D. Bartlett on a rabbit said to be originally brought from the Himalayan Mountains. This animal is smaller than the domestic rabbit, being shorter and more compact, its body is pure white, the nose, ears, feet and tail are of a dark brownish black, the eyes dark red. The fur is much shorter and more nearly equal in length than in the common rabbit. Mr. Bartlett has not yet examined the skull of this animal, but stated that, upon so doing, should he find sufficient difference, upon comparison with the skulls of the other known species, he should then propose for this animal the name of Lepus nigripes.

Tuesday, July 14, 1857.—Dr. Gray, F.R.S., V.P., in the chair.

Mr. Gould having returned from a visit to N. America, whither he had proceeded for the purpose of studying the habits and manners of the species of Trochilus frequenting that portion of America, detailed some of the results of his observations. Having remarked that he arrived just prior to the period of the migration of this bird from Mexico to the North, and having had ample opportunities of observing it in a state of nature, he noticed that its actions were very peculiar, and quite different from those of all other birds; the flight is performed by a motion of the wings so rapid as to be almost imperceptible; indeed, the muscular power of this little creature appears to be very great in every respect, as, independently of its rapid and sustained flight, it grasps the small twigs, flowers, &c., upon which it alights, with the utmost tenacity. It appears to be most active in the morning and evening, and to pass the middle of the day in a state of sleepy torpor. Occasionally it occurs in such numbers that fifty or sixty may be seen in a single tree. When captured, it so speedily becomes tame that it will feed from the hand or mouth within half an hour. Mr. Gould having been successful in keeping one alive in a gauze bag attached to his breast button for three days, during which it readily fed from a small bottle filled with a syrup of brown sugar and water, he determined to make an attempt to bring some living examples to England, in which he succeeded ; but unfortunately they did not long survive their arrival. Had they lived, it was his intention to have sent them to the Society's Gardens, where they would doubtless have been objects of great attraction.

Mr. Gould exhibited a highly interesting species of Ceriornis, which he had found in the collection of Dr. Cabot, of Boston, who, with the greatest liberality, permitted him to bring it to England for the purpose of comparison and description. For this new bird, forming the fourth species of the genus, Mr. Gould proposed the name of Ceriornis Caboti.

Mr. Sclater read a list of upwards of sixty additional species of birds obtained by M. Auguste Sallé from the environs of Jalapa and St. Andres Tuxtla, which were not included in his former Catalogue.

Mr. Chitty read a paper on Stoastomidæ as a family, and on seven proposed new genera and sixty-one proposed new species, and two new varieties from Jamaica. Mr. Chitty took an opportunity of recording his thanks to Dr. Livesay for the great assistance his microscope and ingenious contrivances had afforded him in the examination and measurement of shells, enabling him to measure to the thousandth part of an inch with the nicest accuracy.— *D. W. M.*

Notes on an Excursion from Ega to Tunantins and Fonte Boa, on the Upper Amazons. By HENRY WALTER BATES, Esq.

ON the 7th of November last I left Ega by the small Upper Amazon bi-monthly steamer "Tabatinga," on an excursion to Tunantins, a small village, about 240 miles above Ega: there and at Fonte Boa, on the voyage down, as well as at the mouth of the Jutahi, where also I spent four days, I saw much that was interesting, and propose therefore to give you a rough account of my trip.

Ega, as those at home interested in Amazonian matters are now perhaps aware, is the only place on the upper river at all endurable as a residence for any time; it is really a charming, quiet, cleanly little spot, and being far within the mouth of a black-water river, is nearly free from insect pests: all the villages above, up to Nanta, are nearly uninhabitable,—night and day there is not an hour's peace, and possibly this is the chief cause of the demoralization, laziness and drunkenness of their few inhabitants. The place I was going to was no exception to the rule, so I provided myself with a large mosquito tent, and hoped that for two or three months, amidst the pleasures of acquiring daily new species of insects, birds and shells, I should get along agreeably.

We were four days reaching Tunantins; the passage was a pleasant one, all the passengers but one being foreigners; four or five were Frenchmen on a trading expedition to Moyobamba, one was a Peruvian, of Chachapoyas on the Andes, one a German, and one a Moorish Jew going to Nanta. As to the river scenery, little can be said; the whole distance, and indeed all the way to the river Huallaga, there are the same monotonous low lines of forest as I have before described in the notes on my first voyage from Barra to Ega. The commander of the steamer and the passengers generally gave it as their impression that no difference in width and grandeur was perceptible from Santarem to this part; but, after passing the mouths of the mighty Japurá and the Jurná—that is, from Fonte Boa upwards—I think a difference is perceptible; there were no longer such magnificent reaches and limitless horizons, with fading lines of forest, as occur lower down. In passing along with even speed in a steamer within ten yards of the shore, I observed that there were three distinct kinds of coast and corresponding forest constantly recurring, and the same may be said of the whole upper river. First, there are the low sandy and muddy shores, the most recent alluvial deposits, covered with a dense, tall, broad-leaved grass, often with the arrow-grass, whose feathery-topped flower stem rises to a height of twelve or fifteen feet, sometimes with a uniform forest of Cecropiæ, but without any large trees; besides the banks of the river, many of the islands were of this character. Secondly, there are the moderately high banks, only partially overflowed in the flood season; they are wooded with a magnificent, varied forest, in which palms of certain species are intermingled in a very large proportion; the general foliage is vivid and riant in colour; the water frontage is sometimes covered with a mass of greenery, but where the current sets strong along the friable, earthy banks they are cut away and offer a section of forest, where the trunks of trees appear laden with parasites; in these places the river, for some eight or ten yards out is encumbered with vast fallen trees and *debris* of the forest. The third class of coast is the "terra firme" of the Brazilians, or "terra geral" (the "general country"),—a very apt expression: it consists of a comparatively high, undulating land, the soil generally stiff or clayey. The forest here is of a different character from that of the other parts; it is rounder in outline, more uniform in character, palms are very much less numerous and of different species, and animal life, too, which gives some little animation to the other parts of the river, here is seldom apparent.

At Tunantins I found I was expected, and one room of a dilapidated house was ready for me: its appearance was not very cheering, as the only window was covered over with calico, on account of the piums (a small Muscidæ, a terrible pest), and the walls were disfigured with large mud patches,—work of the Termites. I got all my baggage stowed, hammocks and mosquito tents hung, in a short time, presented my letters of introduction to the only white person in the village, all on the day of arrival, so as to be able to begin work on the following day.

On the 12th of November I had a general survey of my ground, and will give a short description of it. The village, consisting of about twenty houses (four of which only really deserve that name) in a line fronting the river, is situated about a mile within, and on the left bank of, the river Tunantins. This is a small river here, but is probably little inferior to the Thames in size; its waters are of the same black colour as those of the Rio Negro. The population, and that of the neighbourhood, is nearly wholly Indian, chiefly of the two nations Shumána and Passé, which do not now exist in the purely savage state; there are also a few of the nation Caixána, which still exists in the aboriginal state on the river, two days' journey above the village. Like all the settlements on the Amazons, there is but a small tract of cleared space beyond the houses; in this place, overrun with weeds and impurities, and not offering the charming slopes of soft greensward as Ega does. The virgin forest rises as a tall hedge, about a hundred paces behind the village, and thence inland no further sign of the presence of man or the neighbourhood of human dwellings is noticeable, except two narrow paths, leading two or three miles towards the centre. The neighbourhood I found much cut up by narrow valleys and creeks, which, at this season (the waters being as yet low), have only a narrow breadth of water. Immediately below the village enters a broad creek, which half encircles the place behind and above, there is another narrower rivulet. These hollows, being thinly wooded at this season, form deep dells, with tracts of moistened soil towards the water, forming a fine locality for the many beautiful species of Nymphalidæ of the vicinity. These dells and the borders of the forest, and the more humid of the two forest pathways, proved, as I foresaw, the best working grounds to me during my stay.

Circumstances obliged me to leave Tunantins sooner than I had intended, as I had agreed to descend in a sailing vessel belonging to an Ega merchant, which I was told would leave Tunantins after Christmas, but it was afterwards arranged to sail on the 1st of December. However, I worked diligently during my twenty days' stay: the weather was very favourable, and I had nothing to hinder me from making the best of my time. On the slopes of the dell, the first day, I met with two species of Cybdelis new to me, one closely allied to C. Clytia, *Hewits.*, the other to C. Castalia, *Hewits.* A few days afterwards they were in great abundance, in company with Clytia and Castalia, a few Cinara, Celma, Bechina, Eurotas, three other species (also found at Ega), and a third new one, which I did not succeed in capturing. It seemed to be the head-quarters of the genus Cybdelis, as Clytia and another species were in countless multitudes. They are extremely wary and rapid butterflies, settling on the moist ground and darting off to the foliage of high trees on the least alarm. In the same places there were five species of Timetes, all old friends, and a sixth species new to me, but I think known to Science; it resembles T. norica, *Hewits.*, but has the basal half of all the wings silky fulvous: I only captured one specimen. Next to these two genera the Eubages were most abundant, racidula, *Hewits.*, and Erchia, *Hewits.*, two other species old friends, and two species quite new to me. I think every station hence to the Andes will offer, when properly searched, new species of the genera Cybdelis and Eubagis. The two species of Megistanis, the white-belted and rufous-belted, the females of which still remain to be discovered, were also rather common; but they are more frequently seen dashing madly about the houses, settling on the mud or other impurities in their vicinity. Four species of orange-banded Epicaliæ occurred, and E. Ancea I found in the forest: it does not occur at Ega, but turned up again at Fonte Boa. The fifth or sixth day I captured a Catagramma, a species resembling C. cynosura, *Doubld.*, also found at Ega; and a day or two afterwards, after two hours' chase, being led by it round and round the dell from tree to tree, on the trunks of which it settled, I captured a glorious species of the same genus, new to me, and before I left, by daily search, succeding in getting two more specimens. I saw a fourth, and believe that the species will be found some day further up the river, as well as many other new ones of this most beautiful group of insects. On the last day of my stay I captured two of a third species from the trunk of a tree, at which they were imbibing the oozing sap. This species also occurs

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TO CORRESPONDENTS.

A printed document, to which are appended the names of the Lord Bishop of Winchester and forty-three others, has been duly received. The subject is my editorial note, in the April number, disapproving Dr. Knox's paper in the March number. The subscribers think that repudiation of Dr. Knox's views insufficient, because confined to the wrapper. It is peculiarly gratifying to my feelings to find a bishop thus interesting himself in the well-being of the 'Zoologist.' A similar compliment was paid me by the late Dr. Stanley, Bishop of Norwich, whose kind communications, however, contain unmixed approbation of the mode in which the Journal is conducted. In my Address at the end of the year my views on the subject will be repeated.—Edward Newman.

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